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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER	
MCDONALD,R	
ART UNIT	**PAPER NUMBER**
1753	3

DATE MAILED: 09/14/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/781,987	Cha et al.
Examiner	**Art Unit**
Rodney McDonald	1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 10 _____ is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 10 _____ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
18) ☐ Interview Summary (PTO-413) Paper No(s). _____
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

2. Claim 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Edwards et al. (U.S. Pat. 5,259,881).

Edwards et al. teach an apparatus for depositing a layer on a substrate as seen in Fig. 1. Edwards et al. teach in Fig. 1 a cluster tool 10 which includes a front transport module 12 and a back transport module 14. The transport modules 12, 14 are provided with vacuum pumps (not shown) to **maintain their internal chambers at a vacuum pressure level suitable for the processing of semiconductor wafers.** (Column 5 lines 41-52)

The transport modules 12, 14 are interconnected by an interconnecting conduit and aligner 16 that joins the interiors of the transport modules 12, 14 to form common transport chamber 18 **at a consistent vacuum level and of a common atmosphere**. Within the transport modules 12, 14 is a wafer transport mechanism or robot arm 20 that rotates about a central axis of the respective module 12, 14 and extends through the ports to load and unload single wafers

from the adjoining modules, including the processing modules, handling modules and the other transport module. (Column 6 lines 1-11)

The back transport module 14 has six module connection faces or sides for connection to six adjacent modules. On one of these sides is, in the illustrated embodiment, connected a soft etch module 22 for the cleaning or mild etching preconditioning of the surfaces of wafers. A second of these sides is connected to **a first sputter coating module 24, which will typically perform a sputter coating process to deposit a uniform coating on the surface of the wafer**, usually following the soft etch process in the module 22. Another or third side is connected to another processing module, a rapid thermal processing (RTP) module 26, for treating the wafer quickly with high temperatures of, for example 1000.degree. C., to anneal or smooth **a previously deposited coating, such as a metal coating deposited by a sputter coating process in the sputtering module 24**. A forth side is connected to another processing module, for example a sputtering module 28, that may be a sputter etching module or another sputter coating module. A fifth face is connected to another processing module 30 that may be, for example, a chemical vapor deposition (CVD) module. The types of modules and the processes performed therein may be any process suitable to be performed on wafers in conjunction with the other processes being performed by the cluster tool. The sixth face of the transport module is connected to the aligner 16. (Column 6 lines 12-39)

The load-locks 32, 24 each have an access door through which a standard cassette of, for example 25, wafers are held in a rack, usually made of a plastic material such as polypropylene.

The racks are loaded and unloaded either manually or by robot through a load-lock access door 41 into each of the load-locks 32, 34. **The access doors 41, when closed, seal internal load-lock chambers within the load-locks so that they may be pumped to the vacuum environment of the transport chamber 18 to permit entry of the wafers, transferred individually by the transport arm 20, into the transport chamber 18 and to the other modules of the cluster tool 10.** When the transport arm 20 returns wafers to the load-locks 32, 34, the load-lock is vented to the external environment. Except when the load-locks are at the vacuum pressure level of the transport chamber 18, the gate valve between the transport chamber 18 and respective load-lock 32, 34 is closed. (Column 6 lines 51-68)

Connected to the other two faces of the entry transport module 12 are two preferably identical batch preheating, degassing or desorbtion **modules 42, 44.** Each of these modules is equipped to receive, hold and preprocess a plurality of wafers simultaneously, preferably any number up to the quantity held in a full wafer cassette handled by the load-locks 32, 34. (Column 7 lines 1-7)

The batch preheating modules 42, 44 according to certain embodiments of the present invention, will be described in relation to the module 42. Referring to FIG. 2, the preheating module 42 includes a pressure tight housing 50 enclosing a preheating chamber 52. The housing has a hole 53 therein to which a high vacuum pump 54 (removed in this figure; see FIG. 3) is connected to maintain the chamber 52 at a high vacuum, typically equal to that of the transport chamber 18. The module 42 is also conventionally

provided with a second pump (not shown) for lowering the pressure from atmospheric pressure to within the operating range of the pump 54, and with a vent port (not shown) for returning the pressure within the chamber 52 to that of the atmosphere. The housing 50 also has therein, on the front thereof, a rectangular port 56 to which the module is connected to a gate valve 58 (FIG. 3) of the front transport module 12. (Column 7 lines 12-25)

3. Claim 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Turner et al. (U.S. Pat. 5,512,320).

A method for depositing sequential thin films on glass substrates by single substrate deposition comprising loading a batch of substrates into a load lock chamber and evacuating the chamber, transferring the substrates to a batch heating chamber for heating the substrates to elevated temperatures; transferring the glass substrates singly to one or more single substrate processing chambers, and sequentially transferring the substrates back to the load lock chamber where they are batch cooled. (See Abstract)

Liquid crystal cells for active matrix TV and computer monitors are made of two glass plates sandwiching a layer of liquid crystal material between them. The glass plates are made conductive with a thin conductive film on the inside faces of the plates so that a source of power may be connected to them for changing the orientation of the liquid crystal molecules. As the need for larger and more sophisticated cells that allow separate addressing of different areas of the **liquid crystal cell has progressed**, as for active matrix TV where up to 1,000,000 or more different areas or pixels need to be separately addressed, **the use of thin film transistors for this**

application has come into widespread use. Thin film transistors comprise a patterned metal gate over which is deposited a gate dielectric layer and a conductive layer, such as amorphous silicon. **Subsequently applied layers**, as of doped amorphous silicon, etch stopper silicon nitride, silicon oxide, **metal contact layers** and the like, are also required **to be deposited** over the amorphous silicon thin film. **Many of these films are deposited by CVD** in order to obtain high quality films. (Column 1 lines 15-34)

A vacuum system 10 for processing large glass substrates in accordance with the invention is shown in FIG. 1. The vacuum system 10, referring now to FIG. 1, comprises a central transfer chamber 12 to which are connected **two load lock/cooling chambers 14A and 14B**, each for transferring the glass substrates to be processed into the system 10. The load lock/cooling chambers 14A and 14B have a closable opening comprising a load door 16A and 16B respectively on its outside wall for transfer of glass substrates to be processed into the vacuum system 10 from the atmosphere. (Column 3 lines 19-28)

The cassettes 17 in the load lock/cooling chambers 14 are mounted on an elevator assembly (not shown) to raise and lower the cassettes 17 incrementally the height of one shelf. To load chamber 14A, the load door 16A is opened and one glass substrate is placed on a shelf in the cassette 17. The elevator assembly raises the cassette 17 by the height of one shelf so that an empty shelf is opposite the load door 16A. Another substrate is placed on that shelf and so forth until all of the shelves of the cassette 17 are filled. **At that point the load door 16A is closed**

and the chamber 14A is evacuated to the desired pressure in the vacuum system 10. (Column 4 lines 1-11)

A slit valve 20A on the inside wall of the load lock/cooling chamber 14A adjacent to the transfer chamber 12 is then opened. **The glass substrates are transferred by means of a robot 22 in the transfer chamber 12 to a heating chamber 28.** (Column 4 lines 12-16)

After the last glass substrate is loaded into the heat cassette 29, the first glass substrate has reached processing temperature. **After a heated glass substrate is transferred by means of the robot 22 to one of the single substrate processing chambers 40, 42, 44 and 46, it is always replaced with a cold one to be heated. The processing chambers 40, 42, 44 and 46 are adapted to deposit one or more thin layers onto the glass substrates.** Each of the film chambers 40, 42, 44 and 46 are also fitted on their inner walls 40a, 42a, 44a and 46a respectively with a slit valve 41, 43, 45 and 47 respectively for isolation of the process gases. More than one process chamber can be operational at the same time. (Column 4 lines 46-53)

Although the above system is described using a plurality of film deposition chambers, **other single substrate processing chambers can be included** or substituted, including etch chambers, **physical vapor deposition chambers**, preclean chambers and the like. (Column 5 lines 4-8)

The arrows 48, 49 and 50 respectively show the direction of transfer for one possible sequence; arrow 48 shows the direction of **transfer from the load lock/cooling chamber 14B to the heating chamber 28; arrow 49 shows the direction of transfer of a substrate from the**

heating chamber 28 to a CVD chamber 40; and the arrow 50 shows the direction of transfer of a substrate from the CVD chamber 40 back to the load lock/cooling chamber 14B until the load lock is fully exchanged; then when the chamber 14B is venting to atmosphere, load lock chamber 14A is available to the vacuum robot so that continuous processing is provided. (Column 5 lines 21-31)

For the manufacture of thin film transistors onto large glass substrates, the average time for loading a glass substrate into and unloading it out of a load lock/cooling chamber is about 15 seconds for each operation; (Column 6 lines 18-21)

4. Claim 10 is rejected under 35 U.S.C. 102(e) as being anticipated by Kobayashi et al. (U.S. Pat. 6,013,162).

Kobayashi et al. teach in FIG. 1 a plan view schematically illustrating the configuration of a sputtering apparatus of a first embodiment of the invention. (Column 3 lines 29-31)

As shown in FIG. 1, the sputtering apparatus of the embodiment is configured as a system of the **multichamber type** which comprises **a transfer chamber 4** disposed at the center, and **a plurality of chambers arranged around the transfer chamber 4.** The surrounding chambers are airtightly connected to the center transfer chamber 4 via respective gate valves which are not shown. **Each of the chambers is provided with an exclusive or shared vacuum pump system (not shown in FIG. 1) so as to be exhausted to a desired pressure.** (Column 3 lines 33-42)

In the transfer chamber 4, a transfer robot 41 which can transfer a substrate in a vacuum is disposed as a transferring mechanism. Among the surrounding chambers, two adjacent chambers

are used as **a load-lock chamber 2** and an unload-lock chamber 3, respectively. The other surrounding chambers are used as process chambers such as **sputter chambers 1**, and **a preheat chamber 5.** (Column 3 lines 42-49)

A **W film** can be deposited **as wiring** for a channel. (i.e. a metal) (Column 5 lines 2-3)

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney McDonald whose telephone number is (703) 308-3807.

RODNEY G. MCDONALD
PRIMARY EXAMINER

RM

September 12, 2001